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Preview

Fossil Fuel Assets May Turn Toxic

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Stranded assets might lead to an overvaluation of companies and contribute to a carbon bubble with potential negative effects to the economy in the future. Mercure et al. find that even in the absence of stringent climate change policies, current trends in renewable diffusion and increased energy efficiency could lead to stranded assets resulting in substantial global wealth loss and wealth redistribution.

Stranded assets are assets that have stopped earning sufficient economic returns or even turned into liabilities well before their expected economic end-of-life. Stranded assets are considered an inevitable consequence of the normal dynamic economic structural change driven by technological innovation and diffusion but have more recently taken central stage in the sustainability debate as climate change policies and the occurring transition toward competitive renewable technologies have raised questions on value and long-term profitability of fossil fuel companies. Bursting the "carbon bubble" could not only affect fossil fuel companies and industries that use fossil fuels as inputs, but might also impact the entire global economy. In 2017, global investment in new renewables (i.e., renewables excluding large hydro) net additional capacity for power generation was approximately twice as large as in fossil fuel generation for the sixth consecutive year, due in large part to sharp cost reductions especially for solar photovoltaics and wind power.[1] It is worth noting that in 2016 the monetary value of new investments decreased compared to previous years, but capacity still increased mostly because of better energy capacity "bang" for the investment "buck" with lower costs for solar photovoltaics, onshore wind, and offshore wind.[1] Similarly, from 2012 to 2017, global sales of electric cars grew at an annual rate of 66%. China is leading the way with almost half of all new sales in 2017.[2] Altogether, this is not enough to currently displace a significant amount of liquid fuels, but it shows the potential to strand oil-related assets.

This problem of technological obsolescence may be further compounded by social and political pressures leading to fossil fuel divestments of institutional investment funds, such as pension funds, faith groups, foundations, charities, and university endowments, in an attempt to decarbonize portfolios and respond to stakeholder pressure. These divestment initiatives are designed to delegitimize companies' business models still investing in fossil fuel technologies and exploration of new sources that might not safely be burnt under more stringent climate regulations. Yet, according to the International Energy Agency, the global share of fossil fuels, including thermal power generation, in total energy supply investment increased for the first time since 2014, to 59% up slightly from a minimum of 57.1% reached in 2016.[3,4] On the other hand, return on investments for oil and gas companies has been lower than investments in clean energy stocks, providing another indicator for an accelerating transition.[5]

Another important component in potentially fast-forwarding this transition is governmental carbon regulations such as cap and trade, carbon taxation, and clean air policies, which received another impetus through the

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Paris Agreement in 2015 under which 196 parties came together to transform their development trajectories aiming at limiting warming to 1.5°C–2°C above pre-industrial levels. This includes working toward making finance flows consistent with a pathway toward low greenhouse gas emissions and climate-resilient development.[6]

For the fossil fuel industry, the "perfect storm" of a combination of climate policy and fast-track advances in renewables defines the danger zone between industry business-as-usual strategies and actions that would be needed to meet the UN commitment to limit climate change to 2°C. Misreading future demand would potentially lead to an excess of supply where companies are committing to production that may never generate expected returns and create stranded assets.[7] This can have destabilizing effects. For example, the governor of the Bank of England, Mark Carney, has warned that the "vast majority of reserves are unburnable" and the bank itself is conducting an inquiry into the risk that inflated fossil fuel assets pose to the stability of the financial system.[8] In the US, coal power generation and production has been declining largely due to its high costs. According to a recent study, 59 gigawatts (GW) of coal-fired power plants amounting to 17% of the US electricity generation capacity were retired between 2008 and 2016. However, the US is still a major coal exporter and exports have increased by 61% in 2017. According to the same study, coal power generation capacity is still expanding and has doubled in the last 10 years.[9] Also, more than 860 GW of new coal capacity could come on-line soon, increasing GHG emissions by 10%. On the other hand, carbon capture and storage (CCS), which is currently the only technology that could in principle keep these potentially stranded fossil fuel assets in play while meeting climate change targets, has been deployed at a much slower rate than expected. According to the Global CCS Institute there are 17 large-scale CCS facilities operational around the world right now, capable of capturing up to 30 million tons per year of CO_2.[10] Between 2007 and 2017, less than one sixth of the planned $28 billion investment in CCS was actually spent.[4] Should the world be concerned about global wealth loss or even a new recession? We need models to quantify the impact of potentially conflicting drivers. Continuing unabated investment into fossil fuel infrastructure might lead to an economic downturn at the level of the 2008 recession, according to a paper by Mercure et al. published in *Nature Climate Change*, even without adopting new environmental policies.[11] They use an integrated global economy-environment simulation model to study the macroeconomic impact of stranded fossil fuel assets. The model uses historical data to project the uptake of new technologies. The magnitude of these losses could amount to a global loss of $1–4 trillion, which could be amplified by the Paris Agreement or when low-cost producers maintain their level of production despite declining demand. Losses would be experienced through a reduction of value of fossil fuel companies and through macroeconomic impacts such as job losses and lower economic growth. The distributional effects vary based on the marginal costs of fossil fuel production. Fossil fuel exporters with higher production costs would experience a near shutdown of their fossil fuel industry (for example, in the US and Canada, and to a lesser extent in Russia and OPEC countries). On the other hand, a reduction of fossil fuel imports and higher economic activity from investments in low-carbon technologies would create "winners" such as the EU and China.

While the study by Mercure et al.[11] investigated the potential losses (and gains) associated with a transition to low carbon technologies and achieving 2°C, there are significant and systematic implications for not achieving such a goal and moving along a pathway leading to higher average increases in temperature. Climate change is already affecting a wide range of assets associated with extreme weather events. For example, in the US the number of severe storms causing at least $1 billion in economic losses and damages has increased more than 4-fold compared to the 1980s; with the decadal costs having increased from $145.7 billion in the 1980s to $418.4 billion in the last decade.[12]

Both action and inaction on climate change will create stranded assets, and not just of fossil fuel investments. In the absence of complete sufficient mitigation, urban assets in coastal areas could be stranded by sea level rise; infrastructure could be rendered useless by extreme weather events; permanent droughts would permanently devalue cropland; and power generation could be stranded by insufficient cooling water.

Asset management is struggling with the rather novel risks posed by accelerating climate change, nonlinear change, decision-making under uncertainty, and lack of data and appropriate models that move beyond extrapolating from historical trends. The study shows that additional economic damage could be avoided through deflating the bubble by decarbonizing early. Many open questions remain, not least on how to manage the transition to a low-carbon economy, despite resistance from powerful interest groups, and in a way that is relatively equitable and does not destabilize the economy.

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